Vermont EMS Today

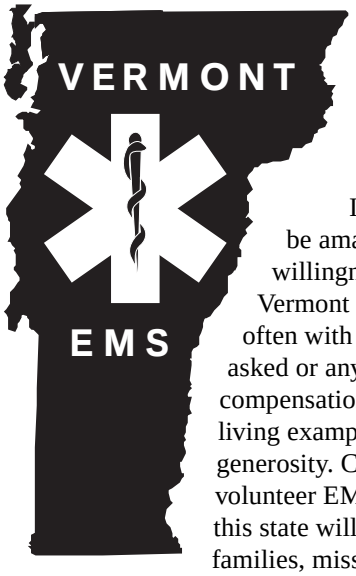
August 2002

From the Director

It Could Happen—

Imagine the scenario of a large earthquake, a major forest fire, a significant flood, a pandemic flu, or some other "disaster" that disrupts Vermont's infrastructure of housing, transportation, utilities and other essential services. Large numbers of people could be left without housing. A major portion of the state could be in the cold and dark for days or weeks without electricity. Grocery store food supplies might run out within a few days.

The health care system could be strained, as we have never seen it strained. Every hospital in the state might be filled beyond capacity. Medications and other supplies might be in short supply. Depending upon the type and location of the disaster, hospital facilities could be destroyed, reducing our system's capacity to deliver health care.



EMS would have a central role to play in managing many disaster scenarios. The initial event might cause some large number of injuries. Even if there were not many patients to begin with, EMS resources could become taxed as operations turn from hours into days or weeks. Crews may become exhausted, vehicles can break down, and supply inventories may dwindle. Squads in one area of the state might be asked to assist in other locations, leaving local resources strained to handle routine emergency calls.

Over the years, Vermont has seen its share of relatively small local disasters. In recent years, an ice storm knocked down trees, damaged power lines in the northwestern portion of the state and disrupted travel for several days. A few years before the ice storm, downtown Montpelier found itself under water as the result of an ice jam during the spring thaw. Vermont has been able to manage these events and move promptly towards recovery as the result of a willingness of neighbors to help neighbors, some good emergency planning, and a backup system of federal support.

EMS would have a central role to play in managing many disaster scenarios.

I never cease to be amazed at the willingness of people in Vermont to help others, often with no questions asked or any expectation of compensation. EMS is the living example of this generosity. Career and volunteer EMS providers in this state will leave their families, miss meals, go without sleep, and routinely suffer other inconveniences in a quest to help others in need. The same can be said for hospital staffs, firefighters, police officers, dispatchers, public works crews, utility company employees, and other emergency responders. When a major event happens, all of these folks routinely go well beyond the extra mile that is already part of their daily service role. The training, resourcefulness, good spirit, and cooperation that these responders bring to Vermont's disasters are key ingredients to successful incident management.

Vermont has also been the beneficiary of good emergency planning.

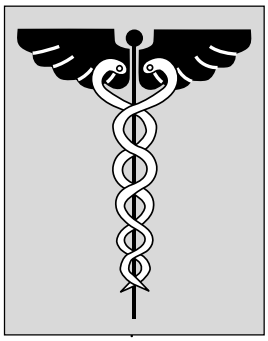
CONTINUED ON PAGE 3

Inside

From the Medical Advisor

Controversy: It Keeps Us Coming Back For More

At our 2002 Vermont EMS Conference held at the Sheraton Hotel and Conference Center in South Burlington, one of our presenters spoke about stroke and its pre-hospital management. In that discussion, the presenter spoke of oxygen supplementation for victims of stroke and indicated that oxygen should be withheld. This has caused some concern among pre-hospital providers and I am pleased to respond to those concerns.



The American Heart Association (AHA) in its publication "Guidelines 2000 for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care," on page I-209 states, "Do not routinely administer supplemental oxygen to nonhypoxic (oxygen saturation >90%) stroke victims with minor or moderate strokes. Oxygen may be beneficial, however, to patients with severe strokes, but additional research is needed." This stance is based upon a sole report in the literature by Ronning and Guldvog,[1] as cited by the AHA.

In this study, 550 patients with acute stroke who were referred to the Central Hospital of Akerhus, Norway within 24 hours after the onset of stroke were assigned, based upon a quasi-randomized method determined by birthdate, to a control or treatment group. The control group received no supplemental oxygen and the treatment group received 3L/min. supplemental oxygen by nasal canula for 24 hours. The study looked at mortality up to 12 months post stroke, impairment evaluated by the Scandinavian Stroke Scale at admission and after seven months, and disability as evaluated by the Barthel Index at admission and after seven months.

The study looked at mortality up to 12 months post stroke…

The study found that survival was 69 percent in the treatment group and 73 percent in the control group. Impairment and disability scores at seven months were comparable for the two groups. The authors concluded that routine supplemental oxygen therapy does not appear to be beneficial for patients after acute stroke and that there is some indication that it may increase the mortality rate in patients with mild to moderate stroke.

It is important to note that some of these patients received oxygen therapy up to 24 hours after their stroke and that the authors caution about the use of oxygen in patients with ***mild to moderate strokes.*** As EMS providers encounter patients, in order for this recommendation to be useful, we would have to know that this was a stroke (not a transient ischemic attack or reversible ischemic neurologic deficit) and that it was of mild or moderate severity. Although no studies have yet confirmed these results, it also implies that treatment with oxygen would only occur for 24 hours by nasal canula at 3L/min.

The proposed mechanisms by which oxygen may cause harm, offered by some authors,[2] include hypoxia causing anaerobic metabolism (metabolism in low or absent oxygen conditions) and depletion of energy stores in the tissues, which worsen brain injury. High oxygen environments may increase the formation of oxygen free radicals, which cause neuronal damage. Very high oxygen concentrations also induce cerebral vasoconstriction, which could reduce cerebral blood flow.

These same authors note in their article, "Stroke patients are at risk from hypoxia due to abnormalities in respiratory function such as hypoventilation, aspiration pneumonia, atelectasis, Cheyne-Stokes respiration and pulmonary embolism. Improving oxygen content may therefore prevent further neurological deterioration in stroke. Evidence shows that stroke patients have lower oxygen saturations compared to matched controls, and that positioning patients upright will improve oxygen saturations as well as reducing intracranial pressure. It has been suggested that supplemental oxygen should be administered if oxygen saturations are below 95 percent."

Other authors[3] have questioned these results, suggesting not only normobaric oxygen, but hyperbaric oxygen treatment. They specifically state that reducing time to treatment enhances the degree of neuroprotection. They note that at least two previous studies have shown that free radical injury does not increase with enhanced oxygen delivery. In response to the concern about arterial vasoconstriction, they state, "At least one human study has shown that acutely ischemic regions have paradoxically elevated blood flow."[4]

CONTINUED ON PAGE 3

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is published as a service for Vermont's emergency medical providers. Suggestions, comments and news items are always welcome. Write or call Leo J. Grenon, Vermont Dept. of Health, 108 Cherry Street, Box 70, Burlington, VT 05402. (802) 863-7310 or 1-800-244-0911 (in Vermont only). Email: VTEMS@VDH.STATE.VT.US

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From the Director—

It Could Happen—

CONTINUED FROM PAGE 1

Many towns and businesses have well-developed plans. The state Emergency Management Office has done an excellent job of preparing a state emergency plan and providing training to key officials who would be involved in managing large scale incidents. In the same way that local agencies put their resources together for the common good in times of emergency, state programs exhibit similar "get the job done" attitudes. In a recent Vermont Yankee nuclear plant exercise, officials from the Nuclear Regulatory Commission commented about the state's success in simultaneously managing an actual flood event that was occurring during the planned drill.

While Vermont can legitimately take pride in how past disasters have been handled, what if a future event is much larger than anything we have ever experienced? Or alternatively, what if a major event in Vermont is also a major event elsewhere in the country and has already consumed the available federal response assets?

Vermont and the other states rely on a network of interstate arrangements to share assets. If Vermont has a need, we are able to request assistance and resources from the federal government or from other states. How these resources are paid for, exemptions from liability during operations, and similar details have been worked out in advance so that during an emergency, requests can be made and assistance can be promptly provided.

During the past year, the interstate planning and arrangements have become the subject of discussions between the New England states and their counterpart Canadian provinces. These discussions were prompted in part by experiences during the ice storm where the Canadians needed U.S. assistance in restoring utility services and discovered that the lack of pre-existing agreements was a barrier to cross-border assistance.

As with any mutual aid arrangement, the emphasis in discussions between Canada and the U.S. is on the term "mutual." The benefit that Vermont stands to gain by having an organized pre-existing arrangement for requesting and receiving Canadian assets is enormous. Quebec in particular has a great deal of capacity in terms of hospital beds, health care workers, ambulances and other health care resources.

The discussions that are underway are another example of how Vermont and the other New England states are quietly leading the nation in preparedness that we all hope will never need to be used. As a small state, we sometimes struggle with having enough resources to meet our day to day demands for services. As a front-line emergency responder, it is important for you to know that when the unthinkable happens, your safety net of back-up resources is in place and getting stronger every day.

—Dan Manz
State EMS Director

From the Medical Advisor—

Controversy…

CONTINUED FROM PAGE 2

Current literature in emergency medicine for the practitioner shows the following: Hickenbottom and Barsan,[5] writing about treatment of stroke patients in the emergency department, state, "Stroke patients with stable respiratory function may receive supplemental oxygen to maintain adequate oxygen saturation, because hypoxia may further worsen ischemia." Lewandowski and Barsan[6] state, "Oxygen delivery and oxygenation should be optimized. Additional supplemental oxygen for those who are not hypoxic has not been shown to improve outcomes in acute ischemic stroke."

In light of all this, our statewide protocols for pre-hospital care stand as written concerning oxygen administration to patients with altered mental status. After a patient has been concluded to have had a stroke of mild to moderate severity, the treating physician can determine whether comorbid conditions exist and if it is in the patient's best interest to have oxygen treatment withheld.

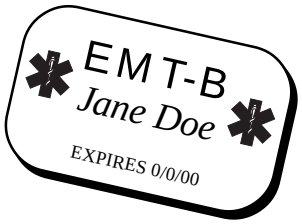
We are delighted that so many wonderful speakers are willing to come to Vermont and to share their knowledge and experience with our providers. One of the few certainties in our business is change and we welcome the diversity of thought and opinion that the speakers raise and that our providers contemplate. I hope that this brief review answers some of the questions raised by my friend and colleague, Dr. Wendy James, in her discussion on stroke. We all await further definitive information on how best to manage patients with "brain attacks."

—Wayne J.A. Misselbeck, M.D.
State EMS Medical Advisor

Notes

1. Ronning OM, Guldvog B. Should Stroke Victims Routinely Receive Supplemental Oxygen? A Quasi-Randomized Controlled Trial. *Stroke.* 1999;30:2033-2037.
2. Bhalla, A, Wolfe CDA, and Rudd AG. Management of Acute Physiological Parameters After Stroke. *Quarterly Journal of Medicine.* 2001;94:167-172.
3. Singhal AB, et al. Normobaric Hyperoxia Reduces MRI Diffusion Abnormalities and Infarct Size in Experimental Stroke. *Neurology.* 2002;58(6):945-952.
4. Nakajima, S, et al. Cerebral Vasomotor Responsiveness During 100% Oxygen Inhalation In Cerebral Ischemia. *Arch Neurol.* 1983; 40:271-276.
5. Hickenbottom SL, Barsan WG. Acute Ischemic Stroke Therapy. *Neurologic Clinics.* 2000;18(2)379-97.
6. Lewandowski CL, Barsan, WG. Treatment of Acute Ischemic Stroke. *Ann. Em. Med.* 2001;37(2)202-16.

Can I Synchronize My National Registry and Vermont Certification Dates?



If you are a Nationally Registered EMT, you've probably noticed that the expiration date on your National Registry card is different from the one on your Vermont certification card. Many EMTs have contacted me in the past few months wondering how they could get them on the same schedule. Before talking about how it can be done, I make a point of discussing with them whether or not they should.

All National Registry EMT-Basic cards expire on March 31, and the year of expiration is determined by when the exam was passed. For instance, if you passed the National Registry exam in the first half of 2002, your National Registry expiration date will be March 31, 2004. If you pass the exam in the second half of this year, your National Registry card will be good until March 31, 2005.

The clock on your Vermont certification, on the other hand, begins on the day you take your initial certification exam…

The clock on your Vermont certification, on the other hand, begins on the day you take your initial certification exam, regardless of whether you passed on the initial attempt.

As an illustration, let's say Billy Doe took the National Registry EMT-Basic exam in January 2001. He failed his first attempt, but he passed when he tried again in August 2001. His Vermont card will run out in January 2003 based on the initial test date, but because he didn't pass the exam until the second half of 2001, his National Registry card will be good until March 31, 2004.

As a result, Billy will have to take the Vermont recertification exam before the end of January 2003, but his National Registry card won't be up for renewal until the following year. A year after that, he'll be due to test for his Vermont certification again, and so on. As tedious as this may seem, leap-frogging expiration dates might actually be better than having both cards run out together. Here's why:

The National Registry will not renew Billy's registration until he shows proof of having passed Vermont's recertification exam. By taking the Vermont recertification exam in the alternate year from his National Registration, Billy will always have plenty of time to complete all the requirements for keeping his National Registration current.

If the two expiration dates were the same, and he waited to test until the last minute, he'd risk losing his National Registration because the National Registry offers no grace period or extension. To regain it, Billy would have to take the initial certification exam again, including the five practical stations.

Something else to note is that you may take your recert exam up to twelve months before your certification expires. Although taking the exam early does not change your certification date, it might allow you to complete all the renewal requirements for both National Registration and Vermont at the same time.

If you are still interested in synchronizing your National Registry and Vermont certification cards, you can renew your Vermont certification by filling out an application and submitting it to the EMS Office along with a copy of your current CPR and National Registry cards. We will issue you a new Vermont certification card good until the expiration date on your current National Registry card. From that point forward, your Vermont certification and National Registration will expire on the same day every two years as long as you continue to meet the renewal requirements for each card. Keep in mind, though, that you may exercise this option only after you have renewed your National Registration at least once. You may not renew your Vermont card with your initial National Registry card.

You may be wondering, "Can I skip the Vermont recertification exam from now on if I keep my National Registration current?" It's a nice idea, but it isn't possible in Vermont. Meeting the state's recertification requirements is a pre-requisite for renewing National Registration. In Vermont, that means you must pass our recertification exam every two years. Special rules apply for Vermont EMTs who are New Hampshire residents. Call me in the EMS Office for more information.

So yes, you can synchronize your Vermont and National Registry dates, but whether it's a good idea or not is an individual decision. We in the EMS Office are happy to answer your questions about this, or any other EMS topic, so feel free to contact us anytime at 800-244-0911 or 802-863-7310.

—Ray Walker
Programs Administrator

Toll-Free Number

Save yourself some money.

When calling EMS from within Vermont, use our toll free number:

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Training UPDATE

Instructor Development

Twelve more EMTs completed the EMS Instructor course in March 2002. They all received orientation to Vermont's rules and policies at the end of the course. In all, 99 EMTs from Vermont have completed the course since it was first conducted more than 10 years ago. Most graduates are coordinating courses, but a significant number have never coordinated a course.

Graduates of Spring 2002
EMS Instructor Course:

Philip Brooks
John Engler
Karen Jenkins
Brian Johns
Robert Maynard Jr.
Gloria Paradis
Christian Phelps
Mark Podgwaite
David Roberts
Steven Salengo
Rebecca Webb
Debra Woods

Esophageal Tracheal Combitube

More than 300 EMT-Intermediates have completed Combitube courses. Nearly every EMS district is now participating in the Combitube pilot program. Areas new to the program include Districts 12 (the Bennington area), 10 (Rutland) and 3 (Burlington).

EMT-Intermediate Curriculum

The EMS Office is continuing the work of adapting the revised national standard EMT-Intermediate curriculum for use in Vermont. After district medical advisors came to consensus on the scope of practice of the EMT-I of the future, district and other officials reviewed the feasibility of such a course in Vermont.

The EMS Office is now drafting language for revising the EMS Rules and drafting curricula for both a transition course for existing EMT-Is and the initial course for EMT-I students. Orientation of EMT-I course coordinators to the new material is expected in the fall. Instructor-coordinators will then be able to conduct EMT-I transition courses. After a sufficient number of EMT-Is have completed the transition course, instructor-coordinators will be able to conduct initial EMT-I courses with skill instruction assistance from EMT-Is who have completed the transition course.

Other tasks the EMS Office will be working on over the next few months include coordination of activities with neighboring states (particularly New Hampshire), creation of written and practical certification examinations and revision of the statewide EMS protocols.

The adapted curriculum will include current treatments of peripheral intravenous therapy, phlebotomy, 50 percent dextrose, 1:1000 epinephrine and naloxone. New interventions will include:

- Pulse oximetry
- Blood glucose measurement
- Esophageal Tracheal Combitube®
- Aspirin
- Nitroglycerin
- Nebulized beta agonist bronchodilator
- Glucagon
- Thiamine
- Use of the Broselow tape.

On-Line Resources

Looking for information on the American with Disabilities Act (ADA)? Try going to *janweb.icdi.wvu.edu/kinder/document.htm*, where you will find the law itself, the rules used to implement the law, technical assistance manuals and many other documents that can enlighten the interested reader.

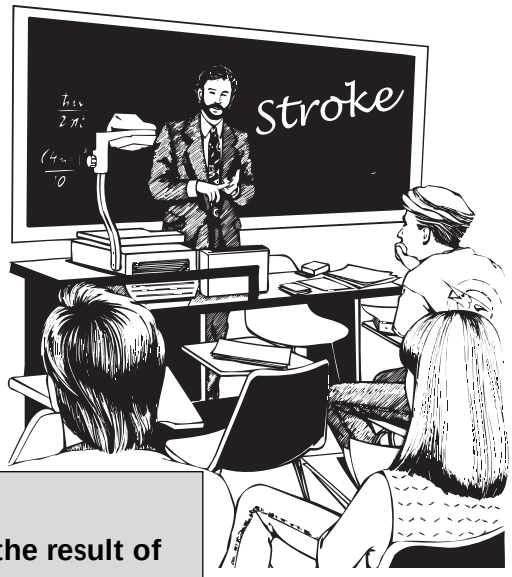
The Food and Drug Administration maintains a site at *www.fda.gov/cder/drug/shortages/default.htm*, where the latest information is available about drug shortages. You can sign up for e-mail notification of drug products added to the Current Drug Shortages, Products Experiencing Limited Distribution, and Resolved Drug Shortages lists by using the appropriate link on that page and completing the Drug Shortages listserv form.

—Mike O'Keefe
State EMS Training Coordinator

Number of people holding Vermont EMS certification as of 3/31/02:

ECA		760
EMT–Basic	(does not include advanced levels)	1257
EMT–I		803
EMT–P		105
Total EMTs at all levels:		**2,165**

Sugar and Stroke:
Is 50% Dextrose Really Harmless?



Ten years ago, EMT-Intermediate (EMT-I) students learned that 50% Dextrose (D50) was a wonder drug. When a hypoglycemic patient received an intravenous injection of this drug, the patient woke up almost immediately. When a patient who was not hypoglycemic received it, the patient was no worse off — D50 was benign when not needed.

EMT-I students today get a slightly different version of the safety profile of D50. Dextrose is still a wonder drug for hypoglycemic patients, but it may be harmful to stroke patients. D50 has the potential to make a stroke patient's condition worse if the blood sugar level is high.

Why has there been this change in practice? What kind of evidence exists to support this approach and how strong is it? What should an EMT-I do when faced with a patient who may be either hypoglycemic or having a stroke or both?

Pathophysiology of Stroke

A stroke is the result of an interruption in the blood supply to the brain, leading to neurologic dysfunction.[1] Because brain cells require a constant supply of oxygen, when they are deprived, they begin to die in the ischemic area. As time goes on, cells in the area surrounding the original damage also begin to be deprived of oxygen. This area is called the ischemic penumbra. In response to this problem, the body attempts to restore circulation to the affected area by dilating nearby arteries. Brain cells that do not regain their perfusion within a short period begin to die, leading to loss of functions controlled by those cells. The dysfunction may be mild or serious, temporary or permanent, depending on the size and specific location of the affected area.

Common signs and symptoms include hemiparesis (weakness on one side of the body), drooping of one side of the face and slurred speech. Depending on the location of the problem, other signs and symptoms may include severe headache, visual difficulties, seizures, expressive aphasia (the inability to express oneself verbally despite retaining the ability to form thoughts and sentences) and changes in personality (for better or worse).

In approximately 85 percent to 90 percent of cases,[2] the cause of a stroke is ischemia from movement of a clot into an artery to the brain or formation of a clot in such a vessel. In the remaining 10 percent to 15 percent, the cause is hemorrhage in the brain. A weakened blood vessel in the cerebral circulation ruptures, often because of longstanding hypertension, leading to headache and loss of function of the affected area. If the bleed is large, it may affect the entire brain, leading to increased intracranial pressure as seen in patients with head injuries.

A stroke is the result of an interruption in the blood supply to the brain, leading to neurologic dysfunction.

Pathophysiology of Hypoglycemia

Definitions of hypoglycemia vary, but most define it as a blood sugar level less than about 60 milligrams per 100 milliliters (mg%) of blood.[3] When the body's feedback mechanisms are working properly, particularly those in the pancreas, the blood sugar level ranges from approximately 70 mg% to 110 mg%.[4] Ordinarily, when the blood sugar level begins to rise, the pancreas secretes insulin to promote movement of glucose out of the bloodstream and into the cells, where it is either used for energy or converted to glycogen for use later. Patients with diabetes have either decreased secretion of insulin by the pancreas or decreased ability of the body to use the insulin that is present.[1] Some patients with diabetes inject insulin to manage their disease; others take oral antihyperglycemic medications; an increasing number take both insulin and oral antihyperglycemic medications; still others control their blood sugar levels through diet and exercise. Untreated diabetes leads to chronically high blood sugar levels, which in turn lead to damage to small blood vessels and injury to many organ systems. People in this situation are at high risk of heart disease, stroke, kidney disease and blindness, among other ailments.

Not every patient with a blood glucose level above normal has diabetes. There are several definitions with different thresholds for what constitutes a diabetic blood glucose level, but all of them leave a gap between normal and diabetic. Patients in this no-man's-land are sometimes told they have "pre-diabetes" and are urged to undertake the same diet and exercise recommended for diabetic patients to prevent or delay the onset of true diabetes.

Hypoglycemia occurs when there is an excessive amount of insulin relative to the amount of glucose available, leading to mass movement of glucose out of the bloodstream and into the cells. This quickly leads to insufficient amounts of glucose in the bloodstream to provide sufficient energy for the cells.

The central nervous system requires a constant supply of glucose and is very sensitive to interruptions in its supply. Neurons in the brain make their displea-

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sure known in two ways: changes in mental status and side effects from the body's attempt to restore sugar levels to normal.[5]

Common mental status changes include confusion, slurred speech, inability to respond to questions or commands, nonsensical statements, drunken appearance, loss of balance, inability to walk without assistance, personality changes, combative behavior and, in severe cases, seizures and coma.

Since one of the effects of epinephrine is to raise the blood sugar level, the body stimulates the adrenal glands to secrete significant amounts of this and other hormones. This results not only in the desired effect, but also in such undesirable side effects as pallor, sweating (these patients are often drenched in sweat), tremors and tachycardia. Unfortunately, the rise in blood sugar level is transient and often not sufficient to make the patient alert enough to ingest food.

Patient Presentations

The classic presentations of stroke and hypoglycemia are quite different. How could someone mistake one for the other?

A stroke usually affects part of the brain, rather than all of it. This typically leads to lateralizing signs, physical exam findings that suggest one side or the other of the brain is affected.[1] For example, weakness on the left side of the body suggests a problem on the right side of the brain, since one side of the brain controls the opposite side of the body. Hypoglycemia, on the other hand, affects the entire central nervous system (CNS) and is much more likely to manifest itself through signs of general CNS dysfunction without lateralizing signs, e.g., abnormal behavior or coma. Unfortunately, these are only the classic presentations of these problems. Although most patients present this way, some do not. This is where one disease can mimic the other.

Severe strokes affecting the entire brain or the part of the brain involved with consciousness can cause coma resembling that seen with hypoglycemia. Conversely, a patient with hypoglycemia can occasionally present with hemiparesis that looks just like the classic presentation of a stroke. The reason for this is not clear, but it may be a result of more glucose transporters on one side of the brain than the other.[6] Hypoglycemia is a well known mimic of stroke.

Nondiabetic survivors of stroke also have a forty percent higher risk of poor functional recovery.

The Relationship between Sugar and Stroke

Between eight percent and 20 percent of stroke patients have a pre-existing diagnosis of diabetes, but many more than that (20 percent to 50 percent of acute stroke patients) present with hyperglycemia.[7] Numerous studies have found that hyperglycemia is associated with a worse outcome in stroke.[8]

In nondiabetic patients, ischemic stroke patients who are hyperglycemic have about a three times higher risk of death than those with normal blood sugar levels. Nondiabetic survivors of stroke also have a forty percent higher risk of poor functional recovery.

Hemorrhagic stroke patients (either with or without a prior diagnosis of diabetes) do not appear to have an increased risk of death associated with hyperglycemia.

Why is there an association between high blood sugar and ischemic stroke? Is hyperglycemia a cause or an effect of a stroke?

The answer to this question is not absolutely clear. Researchers have put forth a number of hypotheses to explain this relationship.[8] One is that a stroke initiates a generalized stress response in the body. This causes the release of epinephrine and other hormones, which then results in hyperglycemia. If more severe strokes cause more stress, it stands to reason that more of these hormones would lead to worse hyperglycemia. A worse outcome, though, would be the result of the stroke, not the hyperglycemia.

Other hypotheses hold that the stroke does not cause hyperglycemia, but that its effects are exacerbated by it. One possibility is that hyperglycemia may be directly harmful to ischemic areas of the brain. It appears that in brain tissue subjected to ischemia, intracellular acidosis occurs when the cells metabolize glucose (anaerobic metabolism). This leads to further chemical changes that accelerate ischemic injury. This may be especially important in the ischemic penumbra, the area directly adjacent to damaged brain cells. This was strongly suggested by a study that found animals subjected to hyperglycemia had more acidosis and greater volume of infarcted brain tissue than insulin-treated hypoglycemic animals.[9]

Another hypothesis is that stroke patients who are found to be hyperglycemic often have undiagnosed diabetes or have blood sugar levels that are higher than normal, but not high enough to qualify as diabetes. In other words, these hyperglycemic patients are diabetic or nearly diabetic, but not diagnosed; their blood sugar levels are not controlled and so they have the same poor outcome as diagnosed diabetic patients.

An intriguing possibility is that hyperglycemia may increase the risk of converting an ischemic stroke into a hemorrhagic stroke. In a study where 138 stroke patients received an intravenous thrombolytic, patients with higher glucose levels had a much higher risk of hemorrhagic conversion of the infarct. On the other hand, another study of 1,259 patients found no association between glucose level and risk of hemorrhage.[8] More study is needed before we can determine whether this hypothesis is valid.

Conclusions and Recommendations

The answer to the question "Is D50 harmful to stroke patients?" is "We think so, but we can't prove it." In light of the potential risk to stroke patients, many authorities recommend caution in administering glucose. There may be no harm, but there appears to be little or no

CONTINUED ON PAGE 8

Sugar and Stroke…

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benefit in the patient with normal or high glucose levels. Consequently, it is prudent to evaluate a patient with a potential stroke for hypoglycemia and to treat it if found, but to refrain from D50 administration if there is no clear indication to administer the drug.

This applies to any patient with altered mental status.[3] Establish and maintain an airway, suction as needed and assist ventilations as appropriate. Administer high concentration oxygen and transport in the appropriate position: supine if the patient is being ventilated, on the side if the patient is unable to maintain an airway alone, sitting if the patient is able to express his or her desire to sit and is able to maintain an airway in that position, and immobilized on a backboard if trauma is suspected. EMT-Intermediates who are trained and authorized and EMT-Paramedics should obtain a blood specimen and check the blood glucose level. If the blood glucose level is less than 60 mg%, secure intravenous access and administer 25 grams of D50 intravenously to an adult (0.5 to 1 gm/kg for a child). If there is no response, consider administering naloxone. EMT-Intermediates need to obtain an on-line order from medical direction to administer either D50 or naloxone.

When a blood glucose monitor is unavailable, the EMS provider should discuss the situation with on-line medical direction. The physician in the emergency department will weigh the benefits and risks and make the decision regarding whether a particular patient should receive D50.

Similar instructions apply when the EMS provider's clinical judgment disagrees with a reading from the blood glucose monitor. Discuss the case with on-line medical direction.

Vermont EMS protocols restrict use of blood glucose monitors to providers at the EMT-Intermediate level and above for a number of reasons. Since EMT-Basics cannot administer an intravenous medication, the treatment they provide is limited to oral glucose. A patient must be awake enough to protect his or her airway for an EMT-Basic to administer oral glucose safely. If the patient is that alert, there is more time to consider the potential for hypoglycemia and treat it, since brain cells are obviously not being subjected to a severe lack of glucose. Additionally, the vast majority of patients treated and transported by EMS in Vermont receive care from providers at the EMT-Intermediate level or higher and will have access to more advanced assessment and treatment.

Any EMS agency using blood glucose meters must comply with the federal Clinical Laboratory Improvement Amendments (CLIA) and manufacturer requirements for device maintenance and operation.

Future research may answer the question of whether glucose harms stroke patients. At least one study has begun that is looking at the effects of a glucose-insulin infusion in patients with acute stroke.[10]

In the meantime, EMS providers will need to evaluate patients with altered mental status carefully for different causes of their condition and act accordingly.

This article is a description of EMS assessment and management of patients with certain conditions. It is not an authorization to act beyond or outside of EMS protocols. Consult your district medical advisor with any questions you have about local practice.

—Mike O'Keefe
State EMS Training Coordinator

References

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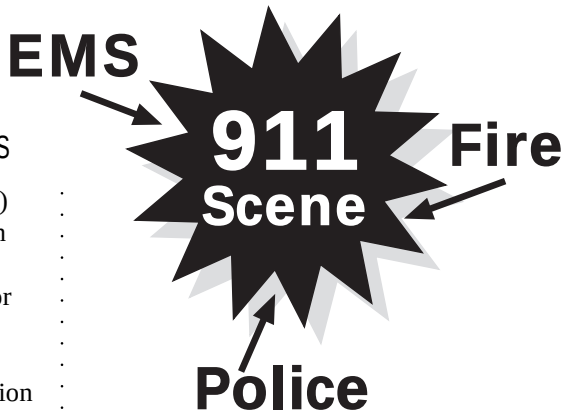
EMS Scene Control

PART III IN A SERIES OF TOPICS RELATED TO EMS FIELD OPERATIONS



It's a quiet afternoon in the late summer when you hear the tones go off, alerting you to respond to a report of a motor vehicle accident/collision at one of the busier intersections in your coverage area. Dispatch advises "unknown injuries, unknown number of vehicles involved, police and fire are enroute." So what types of things are running through your mind as you respond toward the scene?

Hopefully scene safety is right up there, along with personal protective equipment (PPE) and a method to communicate with your partner(s) and dispatch once you arrive. As you approach the intersection, your "windshield" assessment reveals numerous vehicles scattered about, some looking like heaps of scrap metal, others looking as if they may belong to passers-by willing to lend a helping hand or simply taking in the show. At least four vehicles appear to be damaged, traffic is at a standstill, and two small groups of huddled people are near two of the vehicles involved. You cannot tell exactly how many patients you have at this point, but you suspect the number will be four or more. As you exit your vehicle, police and fire apparatus are just arriving. All eyes are on you. How do you proceed?

All eyes are on you. How do you proceed?

Let's consider some of the elements of this call. We have multiple responding agencies to a single incident, and, at least initially, there's the potential for several patients. Sound like a mass casualty incident (MCI)? Maybe not quite, but it could be a multiple patient incident (MPI). Are you prepared to handle this situation? What forms and types of communication are needed? Do you need more ambulances or responders to assist? If you find yourself asking these kinds of questions, combined with what you already know about this incident, it might be time to consider establishing some form of **scene control.**

I'm confident that most (if not all) rescuers have some familiarity with an incident command system (ICS), incident management system (IMS), or unified command system (UCS). One important similarity among these systems is that they all include a position called "Incident Command," where a single individual is responsible for the ultimate outcome of the incident. This person can be from any of the responding agencies, but for this case, the fire chief or highest-ranking firefighter will likely establish Incident Command. So where does EMS fit into this model? Depending upon the type of plan a first responder or ambulance service uses, it varies. The Vermont EMS Office has endorsed the New England Council for EMS (NECEMS) Mass Casualty Scene Management Plan as the recommended plan for EMS agencies licensed in Vermont. The person in charge of EMS at the scene, who reports to the Incident Commander, is called the "EMS Scene Control Officer" under the NECEMS plan.

This concept differs a little from simply having a crew chief or crew captain designated by an ambulance or first responder crew. The crew chief/captain may often act as the EMS Scene Control Officer for an incident (if the situation warrants use of a plan), but whoever assumes the role should communicate this to dispatch and then use the identifier "EMS Scene Control," "EMS Control," or some equivalent (depending on the plan used) when performing radio communications. This person remains in charge of EMS and reports to the Incident Commander until control is handed over to someone else or terminated. Sure, the crew may know that the crew chief/captain is acting as EMS Scene Control, but unless Scene Control is formally established, other agencies may not know if the position has been established or who to contact. EMS Scene Control can be formally established via radio communication to dispatch. This transmission should identify who is assuming control (i.e., radio or member number) and where control has been established (typically a street address). The communication might sound like this: "Dispatch… Member 791 is assuming South Street EMS Control."

Some EMS agencies routinely establish EMS Control on certain types of calls (motor vehicle accidents/crashes, multiple agencies on the same scene, etc.). A few services establish EMS Control for *each and every call*, regardless of nature. Let's return to the crash scenario. The scene appears safe, and you are continuing your scene size up and general impression. One tactic that I've found helpful is to take a walk around the perimeter of the action zone. This only takes a few moments, allows you to quickly scan the entire scene, and helps reduce tunnel vision. While you walk around the scene, a critical question to consider is, "Will I have enough resources to manage this incident with what I have now (or will have in a few minutes)?" Once we've evaluated this, it is crucial that dispatch and other responding units are notified of your assessment. This helps to either get needed resources mobilized to the scene or to discontinue other resources if you determine that they aren't needed. There's a fine balance between not having enough help and then having too much!

Should you establish EMS Control for this type of call? At what point will

CONTINUED ON PAGE 11

Shaken Baby Syndrome

Shaken Baby Syndrome (SBS) is a form of child abuse resulting from the violent shaking of an infant or young child. The injuries associated with SBS are clearly definable and involve clinical findings that differ from those of other forms of pediatric head trauma. The forces required to cause SBS are significant. In fact, the American Academy of Pediatrics states that the shaking forces required to cause SBS are so significant that anyone witnessing this abuse would easily recognize it as dangerous.

Luckily, EMS providers do not encounter SBS very often. However, by understanding the details of SBS, we will be better prepared to respond to the needs of these patients and document our encounters appropriately.

How old are victims of SBS?

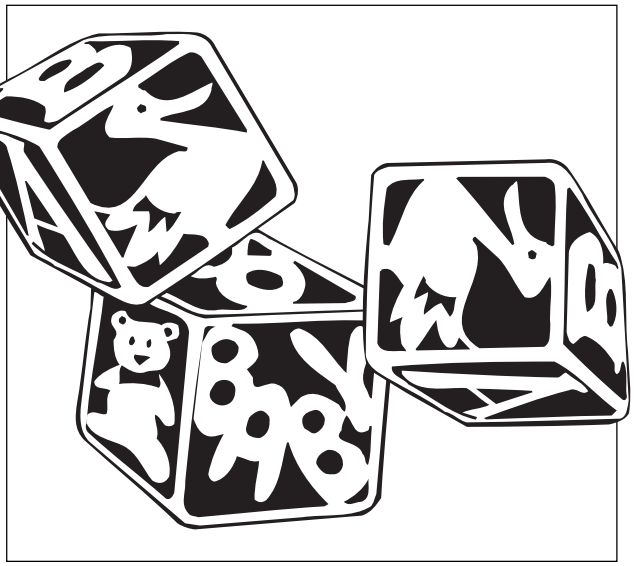
The victims of SBS are typically less than 24 months old although SBS has been documented in children as old as 5 years. Children older than 2 years are larger and heavier, and most adults lack the strength to shake a child older than 24 months with enough force to inflict SBS.

Are males or females more likely to become victims of SBS?

In 1998, the Child Abuse Prevention Center's National Information, Support and Referral service on SBS conducted a survey of the Child Fatality Review Teams in the United States. This survey revealed that the victims of SBS are split almost evenly between males and females (SBS in males was slightly higher than SBS in females). Approximately 70% of the perpetrators of SBS were male.

What kind of force is necessary to cause SBS?

Interviews with perpetrators of SBS reveal that extremely violent shaking of the victim causes these injuries. The victim's neck flexes and extends as the head moves back and forth, almost in a figure eight pattern. In some cases, the victim is thrown to the ground after being shaken.



The forces required to inflict SBS are tremendous. SBS is not caused by short falls, CPR, or by bouncing a baby on your knee.

How do shaking forces injure the brain?

There are two major injuries that occur as a result of SBS: diffuse axonal injuries and disruption of bridging veins around the brain.

Diffuse axonal injuries occur when the axons of brain cells become stretched due to the oscillating and rotational forces created during the shaking episode. As these axons receive this stress, some will begin to tear and retract. These torn axons permanently lose their ability to transmit signals to other brain cells. Depending on the severity of these injuries, the child might exhibit symptoms ranging from minor cognitive delays to brain death.

Our brains have small bridging veins that return blood from the brain back to larger veins and eventually to the heart. When a baby is shaken violently, the brain moves about inside of the skull. This movement of the brain inside the skull stretches these bridging veins and may cause them to tear. The resulting hemorrhage can cause brain damage ranging in severity from minor damage to death.

Rib fractures are another source of injury related to SBS. While such fractures are difficult to assess in the field, X-ray films might show rib fractures around the area where the ribs connect with the vertebrae. These kinds of fractures often occur when an adult encircles a child's body with his/her hands and squeezes firmly. This is usually the way a child is held while being shaken.

Does the child's head have to impact another object in order to cause SBS?

Some medical professionals believe that SBS is caused by the combined forces of shaking and impact with another object. For example, these professionals believe that victims of SBS are not only shaken, but also slammed against other objects like beds or floors. While there are certainly cases of shaking combined with impact, most SBS experts agree that shaking forces alone are capable of causing the injuries associated with SBS.

How does SBS present to prehospital providers?

This is a very difficult question to answer because the range of possibilities is so large. Victims of SBS present much like any patient with a head injury. You can expect to see

CONTINUED ON PAGE 11

changes in the child's mental status, including an inability to recognize or track faces and objects. On the other end of the spectrum, some SBS victims are unresponsive, convulsing or even in cardiac arrest. Your treatment of these symptoms should include spinal immobilization, airway management and oxygenation and ventilations and/or CPR if necessary.

There are many reasons for altered mental status, convulsions and cardiac arrest in children. EMS providers should not jump to conclusions about the mechanism of these signs or symptoms. The best thing you can do is thoroughly assess the patient and get as much information as you can from the child's caregivers.

It is also worth mentioning that victims of SBS often have a history of previous abuse. When examining the child, pay careful attention to any bruises or marks on the child's body.

How should we document and report SBS?

In Vermont, any time an EMS provider suspects that a child is being abused or neglected by a caregiver, there is a legal requirement to report the incident to Social and Rehabilitative Services (SRS). It is important to note that EMS providers do not need to have proof of abuse or neglect; suspicion alone is cause for a report to SRS. It is the responsibility of SRS to investigate the incident and determine if the caregivers were neglecting or abusing the child. SRS is accessible 24 hrs/day at 800-649-5285.

EMS providers should never accuse caregivers of abuse. Instead, carefully assess the patient and scene and pay careful attention to anything a caregiver tells you. Document your observations as objectively and thoroughly as possible.

When a child is abused, caregivers often describe a mechanism of injury inconsistent with the patient's condition. Caregivers often change their description of the incident several times. It is very important for EMS providers to thoroughly document anything the caregivers say about the incident. You should also document the emotional state of the caregiver at the time he/she was talking to you. Was the caregiver crying, scared or otherwise distressed when describing the incident? Did the caregiver confess to abusing the child? Information about the emotional state of a caregiver plays a role in determining whether such statements are admissible in court.

Can SBS be prevented?

As EMS providers, we can play an important role in injury prevention. The unfortunate thing about SBS is that once the damage is done, there may be few treatment options for the child. For this reason, prevention is our best option when dealing with SBS.

Prevention programs should be designed to teach caregivers the dangers of shaking a baby, and to point out the importance of being patient with a baby. Most SBS incidents occur when a child is crying and the caregiver becomes frustrated. Caregivers should be taught that babies cry for many reasons and that caregivers should patiently try to understand why the baby is crying. Some caregivers falsely believe that the baby is trying to be manipulative. When caregivers begin to feel angry or frustrated with the child, they should leave the room and let the baby cry. It is better to let a child cry than to become frustrated enough to harm the child. Caregivers in this situation should call a friend or relative for help if they don't feel they can safely address the child's needs.

Remember that men are usually the perpetrators of SBS. Prevention activities that EMS providers are involved with at the community level should include male caregivers.

If you would like more information about this topic, or if you would like to hear more about SBS prevention activities, please feel free to contact me at the EMS Office.

—William Clark, EMSC Specialist
Pediatric EMS Coordinator

EMS Scene Control

CONTINUED FROM PAGE 9

you make the decision? EMS Scene Control would typically be indicated for this event, but you may wish to consider your service's standard operating procedures/guidelines (SOPs/SOGs) and your own comfort level with EMS Scene Control and how it applies to the incident. Why don't rescuers establish Scene Control when necessary? Many reasons come to mind, including decreased planning and training opportunities, administrative policies, experience levels of rescuers, and misplaced concerns about liability, to name a few.

Establishing and using EMS Control on smaller-scale incidents will ultimately prepare us to better handle major disasters. EMS Scene Control provides a single, identified source for resource planning, deployment, and demobilization (placing units back in service and/or canceling unneeded units), and can be implemented as a part of a full ICS plan if necessary. Communication plays a key role during multiple patient or multiple agency events, yet there are many rescuers who cringe at the idea of establishing EMS Control. As a result, EMS incidents in this state, which may be handled more efficiently through this component of the NECEMS plan, are not being managed in this way often enough.

I encourage you to speak with your service chief if you have questions or concerns about plans to manage EMS incidents. Again, my intent in writing these articles is to stimulate thought and discussion regarding EMS operational matters, and not to override any present service policies or guidelines. As always, I welcome your questions and thoughts.

—Steve Salengo
State EMS Operations Coordinator

File Update

Have you moved or changed your phone number or name since the last time you certified or recertified? Let us know so we can keep our records up-to-date.

Change of name and address form:

OLD INFORMATION:

Name _____

Address _____

_____ Zip _____

Phone _____

NEW INFORMATION:

Name _____

Address _____

_____ Zip _____

Phone _____

Certification number _____

Send to: Vermont Dept. of Health, Division of Health Protection
EMS & Injury Prevention
P.O. Box 70, 108 Cherry Street
Burlington, VT 05402

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